

Utah Lake Water Quality Study: Joint Steering Committee and Science Panel Meeting



May 31, 2018

*Division of Water Quality
Utah Department of Environmental Quality*

Results and Implications of the Phase I Report

Overview of Phase I Process and Results



Phase 1 Work Elements

Task 1 – Stakeholder Development

Task 2 – Data and information management

Task 3 – Designated Use Assessment

Task 4 – Source and nutrient load analysis

Task 5 – Model Selection and Development

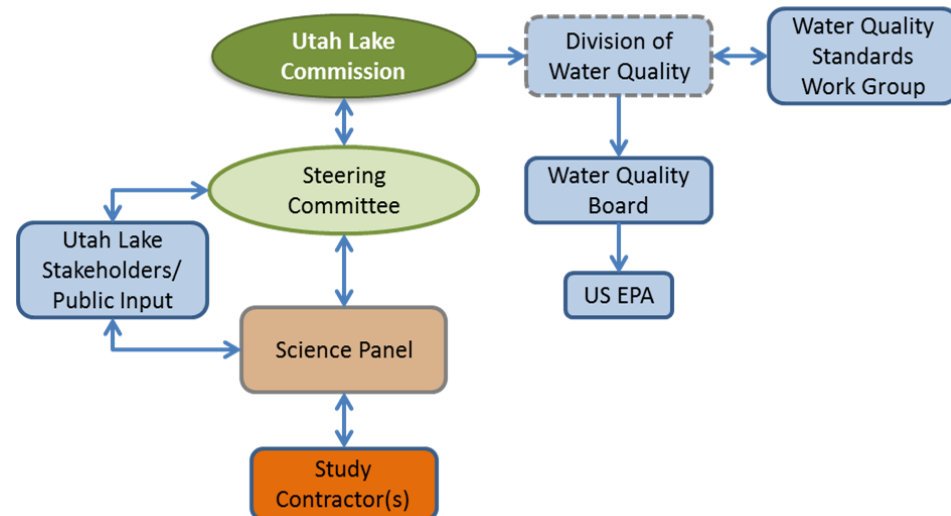
Charter Development

Charter Development (Nov 2016 to June 2017)

Steering Committee Nomination (June 2017 to July 2017)

Facilitation Team (November 2017)

Phase II Kickoff (January 2018)



Task 2 - Data and Information Management

Data compilation and database development

- Share data
- Populate Database
- Circulate Database

Coordination of monitoring activities

- DWQ Monitoring Activities
 - Sampling Analysis Plan (SAP) & Standard Operating Procedures (SOPs)
- Coordination
 - USU
 - UU
 - Wasatch Front Water Quality Council

Literature Review and synthesis

Data Compilation and Database Development

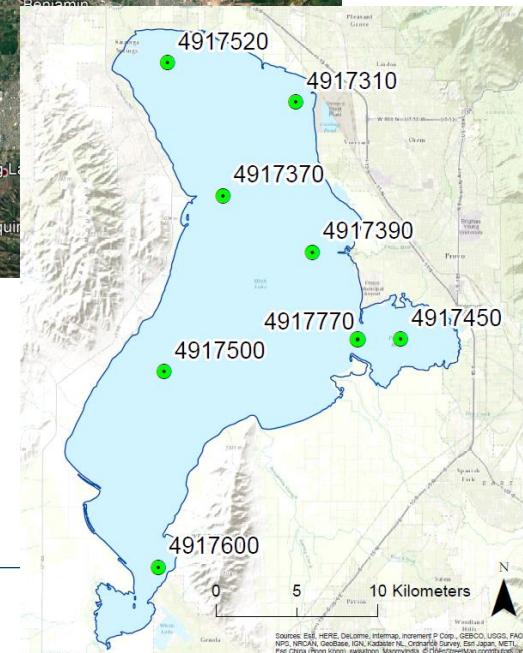
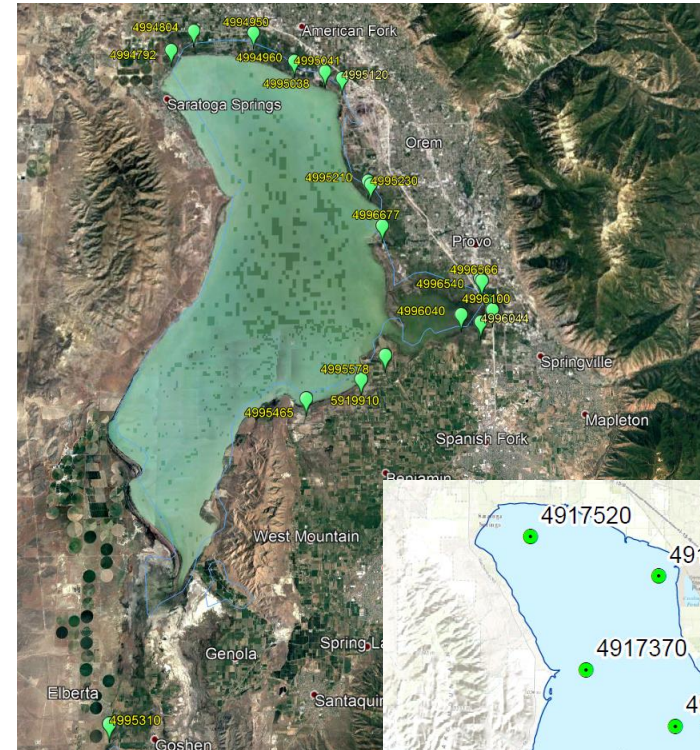
Data Type	DWQ	USGS	USU	BYU	UU	UVU	WFWQC	CUWCD	Water Rights	Larry Gray
Water Chemistry	X			X	X	X	X	X		
Flow-USGS		X								
Flow	X						X			
Lake Elevation			X						X	
Pressure Transducer	X									
YSI Sondes or Aqua Troll 600	X									
EXO Sondes	X									
CH-A	X						X			
Discharge Monitoring Report	X									
Sediment					X		X			
Macro-invertebrate							X			
Phytoplankton	X									
Zooplankton			X							X
Vegetation Monitoring						X				
Macrophytes and Phragmites			X			X				
Fish Sampling	X					X				



Monitoring Coordination

Coordination of monitoring activities

- DWQ Sampling Plan
 - High frequency flow and open water sondes
 - Monthly inflow (18 sites)
 - Monthly open water (11 sites)
- Partners
 - USU
 - UU
 - BYU
 - Wasatch Front Water Quality Council



Literature Review and Synthesis

Updated Utah Lake Bibliography

- Merge existing bibliographies
 - DWQ, USU, previous studies
 - Key word search

Literature Review and synthesis

Beneficial Use Assessment (Task 3)

Beneficial use assessment

- Update 2016 Integrated Report

Baseline data characterization

- Data completeness
- Analysis of trophic related parameters
- Data gap analysis

Utah Lake Data Explorer

- <https://udwq.shinyapps.io/UtahLakeDataExplorer/>

Water Budget and Bulk Loading

Water budget

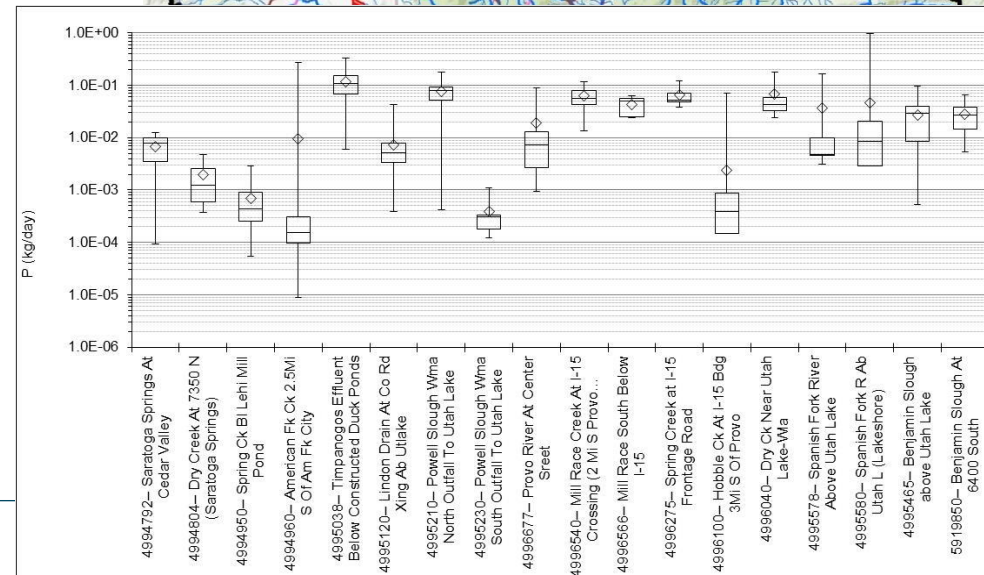
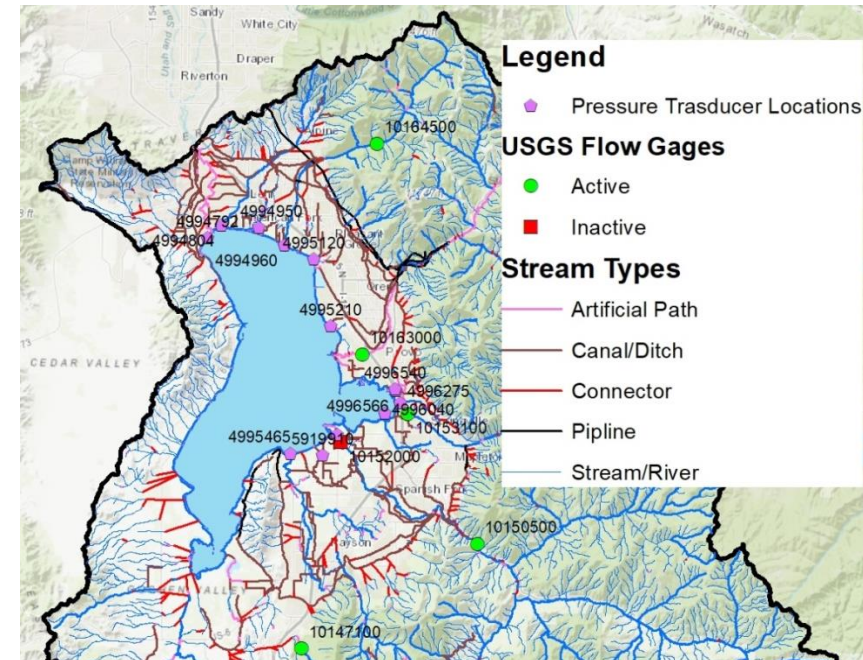
- Utah Lake Water Quality Salinity Model
 - Monthly flow for all inputs
 - Incorporates available flow data
- Data Characterization
 - Continuous flow
 - Instantaneous flow

Load Analysis

- Pollutant Loading Assessment
- Wasatch Front Water Quality Council

Hydrologic influence on loading

- Flow frequency analysis
- Hydrograph evaluation



Source Characterization

Metadata analysis

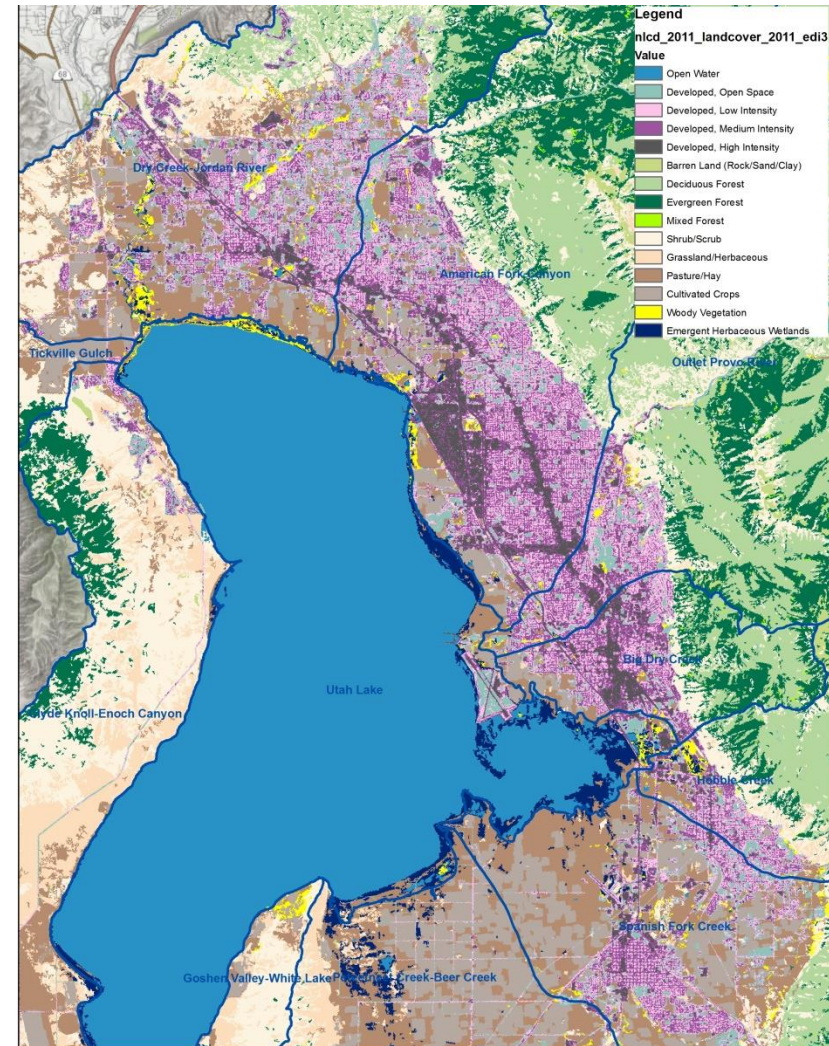
- Watershed loading data inventory
- Monitoring data
- geographic
- Land use/land management

Stormwater

- Estimated loading range
- Targeted stormwater monitoring

Watershed Model Development

- Evaluate U of U model for watershed source characterization



Utah Lake/Provo River Watershed Coordinator

Partnerships

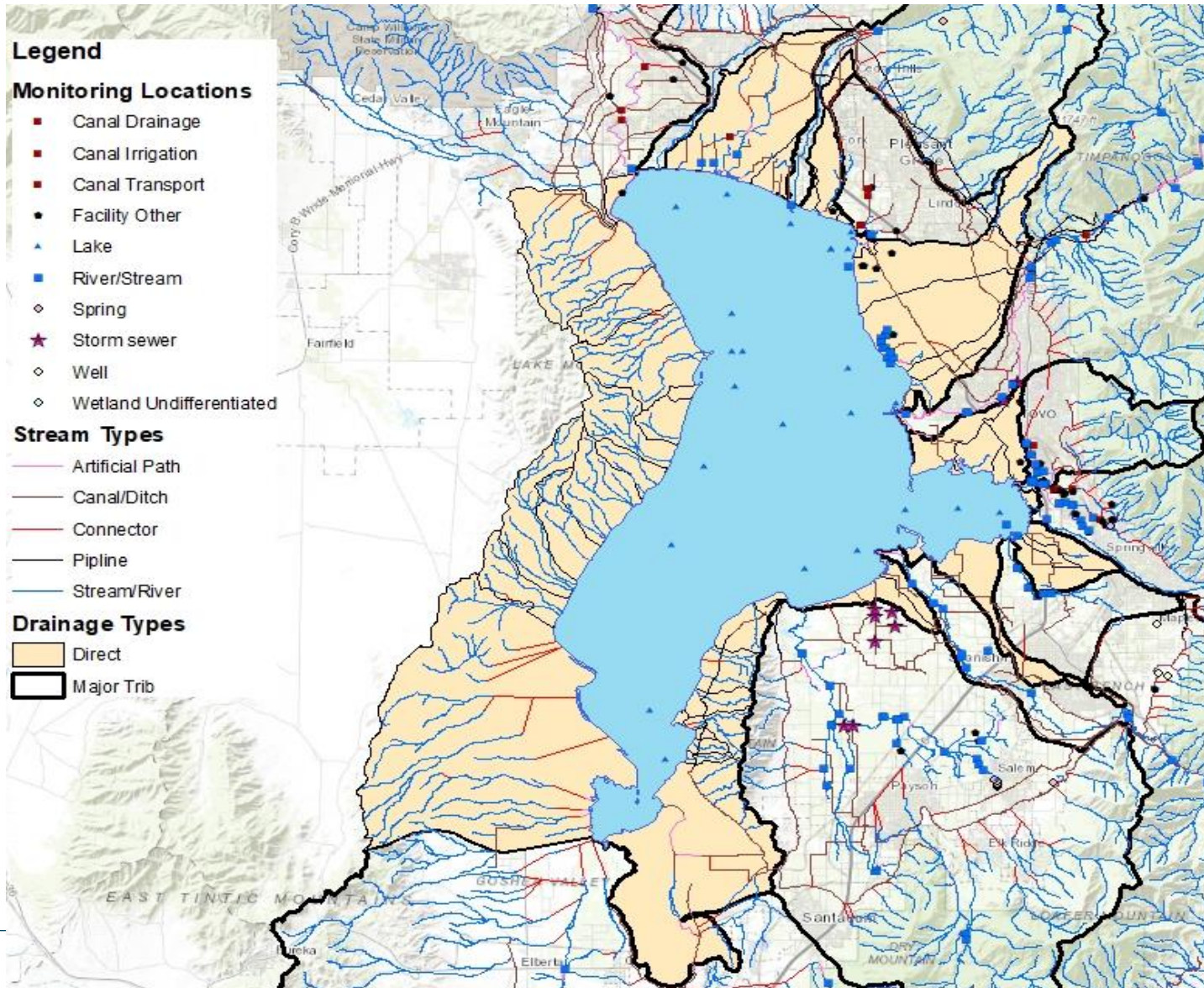
- UDAF
- DWQ
- NRCS
- Local Conservation Districts

Objectives

- NPS monitoring and characterization
- BMP implementation planning
- Demonstration project development
- HAB monitoring
- Spanish Fork CRMP implementation



Direct Drainage Watersheds



Model Selection and Development (Task 5)

Model Selection Process

- Stakeholder subgroup
- Evaluate model options
 - Complexity, processes, data requirements, transparency, flexibility, compatibility

Model Selection

- Water Quality Analysis Simulation Program (WASP)
- Environmental Fluid Dynamic Code (EFDC)

Model Name	WASP	CAEDYM	PCLAKE	CE-QUAL-W2
Spatial Dimension	1D-H	1D-V	0D	2D-V
Stratification	-	+	-	+
Inorganic Sediment Groups	3	2	1	>3
Littoral Zone	-	+	+	-
Phytoplankton Groups	3	7	3	>3
Zooplankton Groups	1	5	1	>3
Benthic Algae Groups	1	4	1	>3
Macrophyte Groups	+	1	1	>3
Macroinvertebrate Groups	0	3	1	0
Fish Groups	0	3	3	0
Bird Groups	0	0	0	0
Hydrodynamics	+	+	±	+
Temperature Dynamics	+	+	+	+
Oxygen Dynamics	+	+	+	+
Inorganic Carbon (CO2/DIC) Dynamics	+	+	-	+
Organic Carbon (DOC/POC) Dynamics	+	+	+	+
Microbial Dynamics	+	+	±	+
Internal Phosphorus Dynamics	+	+	+	+
Phosphorus Sorption to Sediment	±	+	±	±
Internal Nitrogen Dynamics	+	+	+	+
Internal Silica Dynamics	+	+	±	+
Sedimentation/Resuspension	±	+	±	±
Sediment Diagenesis	+	+	±	+
Fisheries Management	-	±	+	-
Dredging	-	-	+	-
Mowing	-	-	+	-
Ice Cover	+	-	-	+
Clear-Turbid State Transition	-	±	+	±



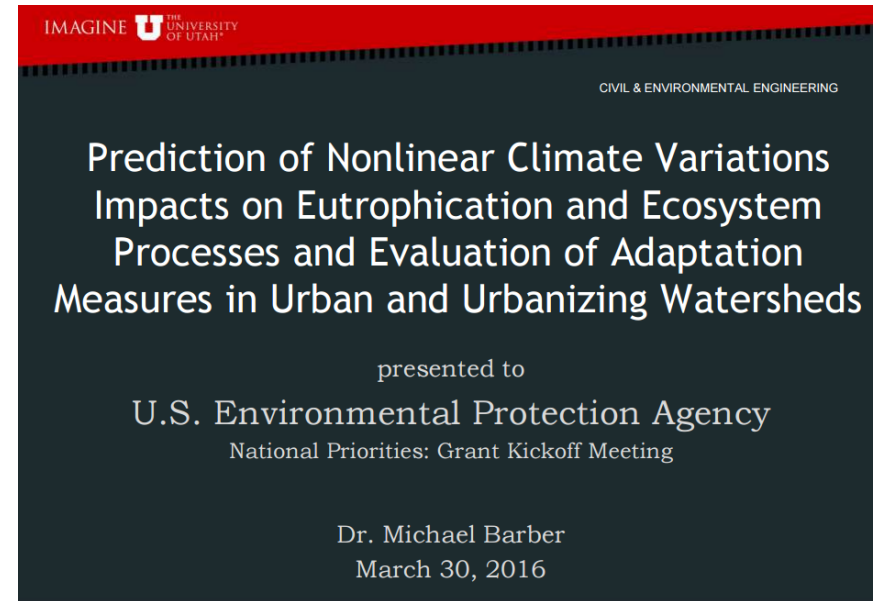
Model Development (Task 5)


Model build and calibration

- University of Utah
- Coordination with EPA Region 8 and DWQ through MOU
- DWQ participation on modeling team

Model application to water quality criteria and TMDLs

- DWQ and Science Panel



IMAGINE  THE UNIVERSITY OF UTAH

CIVIL & ENVIRONMENTAL ENGINEERING

**Prediction of Nonlinear Climate Variations
Impacts on Eutrophication and Ecosystem
Processes and Evaluation of Adaptation
Measures in Urban and Urbanizing Watersheds**

presented to
U.S. Environmental Protection Agency
National Priorities: Grant Kickoff Meeting

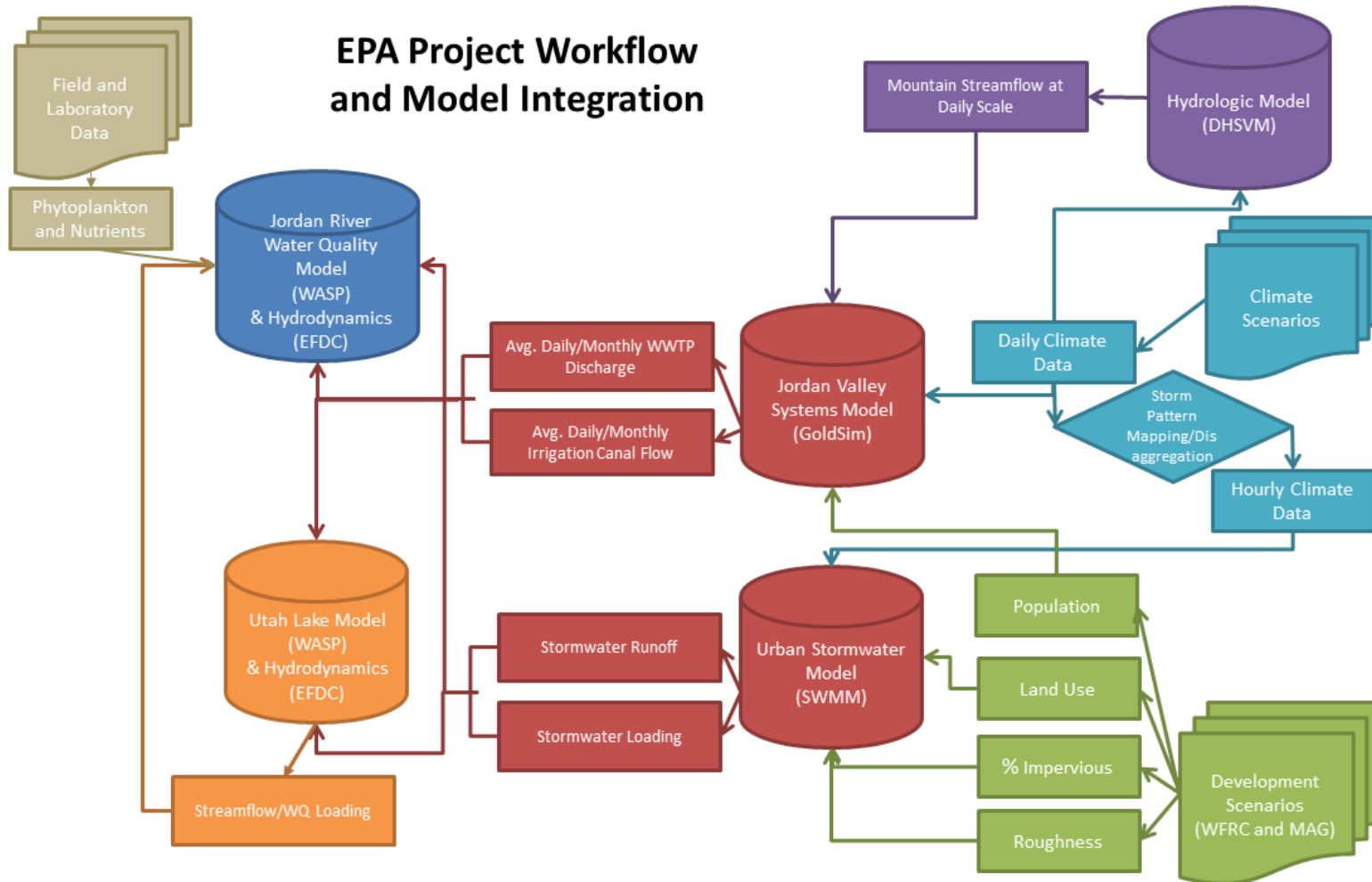
Dr. Michael Barber
March 30, 2016

Research Team

- Michael Barber, Ph.D
- Steve Burian, Ph.D
- Ramesh Goel, Ph.D
- Sarah Hinnners, Ph.D
- Brett Clark, Ph.D

Model Development

EPA Project Workflow and Model Integration



Discussion

utahlake.deq.utah.gov



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